

UNITED STATES PATENT OFFICE.

EDWARD KAYLOR, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN PLANING THE RIM-BASES OF GUNS.

Specification forming part of Letters Patent No. 43,510, dated July 12, 1864.

To all whom it may concern:

Be it known that I, EDWARD KAYLOR, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful improvement in machinery for planing the rim-bases of guns and other irregular curved surfaces; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top view of my machine, showing the cutter at work on the rim-base of a gun. Fig. 2 is a plan or top view of the grooved barrel and its bearer. Fig. 3 is an end elevation of Fig. 2. Fig. 4 is an end elevation of a groove-frame of slightly different construction from that shown in Fig. 3.

In the several figures like letters of reference denote similar parts.

The object of my invention is the planing or dressing of metallic bodies by machinery, so as to give them, when finished, a prescribed irregular curved surface or conformation, and is especially adapted to turning the rim-bases of guns and planing the body of the gun around the rim-bases; also the sight-masses and lock-masses which project from the surface of the gun.

It is well known to those skilled in the art that guns, whether made of wrought-iron, cast-iron, or brass, are dressed or finished by the process of turning. This is effected by causing the gun to revolve on its axis horizontally in front of a steel cutter, which is gradually moved lengthwise from one end to the other of the gun, while it is also fed forward toward the axis of the gun until a sufficient depth of metal is cut away to give the proper exterior shape and finish to the piece. This is readily accomplished in that part of the gun which extends from the muzzle to the front side of the rim-base and from the rear side of the rim-base to the breech end, excepting where the lock-masses project from the surface of the piece. The projection of the rim-bases and trunnions and the sight-masses and lock-masses beyond the surface of the body of the gun prevents the turning of that part of the periphery of the gun which lies between the rim-bases on either side and around the sight-masses, because those projecting parts would interfere with the cutting-

tool. It is therefore necessary to dress these parts of the body of the gun by a planing-tool operating in lines parallel to the axis of the gun. The trunnions are also turned by means of a hollow chuck having a cutter or cutters projecting from its interior surface and revolving on its axis, which is concentric or coincident with that of the trunnion. This is easily effected, because the trunnions are cylindrical in shape and of uniform diameter throughout; but the rim-bases cannot thus be turned, because, although usually cylindrical in shape, they extend to the exterior curved surface of the gun, and, as the axis of the rim-base is at right angles to the axis of the gun, the depth of the rim base from the trunnion to the surface of the gun is constantly varying at different parts in the circumference of the rim-base, and sometimes in large guns the rim-base enlarges in diameter at its base in a curved line which merges into the curved surface of the body of the gun.

Owing to the contour of the surface of the rim-base, it has been heretofore found impracticable to turn the rim-base, even when of cylindrical shape, below the point where it first comes in contact with the surface of the gun, and the remainder of the rim-bases and the surface of the gun around them has been chipped off by hand, which is a very tedious, and therefore expensive, operation, as in a large gun it will occupy two workmen about a week to dress the two rim bases.

My invention is designed to plane away the surplus metal around the rim-bases and sight-masses and lock-masses of guns by machinery, giving to the rim-bases any shape that may be desired, and thereby to accomplish by machinery and in a short space of time what has heretofore been done only by the slow process of hand-labor.

In planing the rim-bases I accomplish the object just stated by causing the cutting-tool to revolve around the rim-base, not in a plane at right angles to the axis of the rim-base, but in a curved line corresponding with the contour of surface required to be given to the rim-base where it joins the body of the gun, or to the surface of the gun around the rim-base, as the case may be. The point of the cutter, as it revolves around the rim-base in a circle the center of which is in the axis of the rim-base, preserves a uniform distance from its

center of motion, excepting when fed in or out, so as to plane the surface of the gun around the rim-base, but at the same time has a varying motion parallel to the axis of the rim-base and toward or away from the body of the gun, corresponding with the curved surface required to be given to the rim-base or body of the gun around the rim-base. By this means I am enabled to give to the rim-base and to the body of the gun around it any required shape with as much ease as a cylindrical shape can be turned by the ordinary machinery for that purpose.

To enable others skilled in the art to use my improvement, I will proceed to describe the construction and operation of my machine.

In Fig. 1 of the drawings, A is a gun, which is supported in a horizontal position with its axis at right angles to the main shaft *a* of the machine, the axis of which is in the same horizontal line as the axis of the trunnions B B of the gun C C in the rim-bases of the gun. The shaft *a* is supported by the bearings *b b' b''*, in the upright portions of the frame, which are bolted to two horizontal bed-plates, *c c*.

Attached to the forward end of the shaft *a* is the cutter-head or chuck *d*, from the face of which projects the sliding bits *e e'*, in one of which is inserted the cutter or planing-tool *f*, the point of which is shown in Fig. 1 resting against and operating upon the outer extremity of the rim-base *c*. The screws *g g'*, on opposite sides of the cutter-head *d*, operate upon the sliding bits *e e'*, moving them toward or away from the center of the cutter-head *d*. The cutter-head *d* has a cylindrical cavity to receive the trunnion B of the gun, which cavity is of sufficient depth to allow the cutter to reach and act upon the surface of the gun around the rim-base.

Parallel to the main shaft *a*, and to one side of the machine, is placed a gearing-shaft, *h*, to which is attached the pinion *i*, which gears into the large toothed wheel *i'*, attached to the sleeve *k*. The main shaft *a* passes through the sleeve *k*, and revolves with it, the shaft and sleeve being connected by a feather so that the shaft can slide horizontally through the sleeve without interfering with their revolution.

On the shaft *a*, in the rear of the bearing *b'*, is a cylindrical groove-barrel, *m*, which is rigidly attached to or forms a part of the shaft *a*, it being essential that the shaft *a* should revolve on its axis with the groove-barrel *m*, and that any horizontal motion of the groove-barrel should be communicated to the shaft. The groove barrel *m* is supported by an upright bearer, *n*, set upon flaring ways *q q* in the sliding frame or carriage *j*, which is bolted to the two horizontal bed-plates *c c*. The flaring ways *q q* form a dovetail connection between the bearer *n* and the sliding frame *j*, thus holding it down to its seat, and yet allowing the bearer to be moved backward or forward on the ways. (See Fig. 3.) When the sliding

frame of the bearer is set so as to bring the chuck *d* in proper position for the tool *f* to operate on the rim-base of the gun, the bearer *n*, and with it the groove-barrel *m*, and shaft *a*, and chuck *d*, are fed forward gradually toward the gun, as the work progresses, by means of a feed-screw, *r*, (see Figs. 2 and 3,) which has its bearing *l* in the frame or carriage *j*, and the screw-threads of which take into a female screw in the bottom of the bearer *n*.

Surrounding the barrel *m* are two grooves, *o* and *o'*, each of which has parallel walls or sides, which grooves are cut into the surface of the barrel *m*. The forward groove, *o*, (which is narrower than the other,) receives the guide-pin *p*, at the extremity of which may be placed a roller. The guide-pin *p* is passed through a suitable hole in the side of the bearer *n*, as seen in Fig. 3, and its projecting extremity enters the groove, and as the guide-pin is stationary and the groove barrel *m* revolves with the shaft *a* on its axis, the shaft receives a horizontal motion corresponding with the curvature of the groove *o*, which is not cut in a plane at right angles to the axis of the shaft *a*, but is so shaped as to cause the shaft *a*, and with it the cutter *f*, to describe in its rotation an irregular curve corresponding exactly with the line formed by the intersection of the periphery of the rim-base with the surface of the gun. By this means the cutter *f*, in passing around the rim-base, describes exactly the curve which it is required to do to plane the surface of the rim-base close to the point where it unites with the body of the gun.

While planing around the rim-base from the trunnion to the body of the gun, if the rim-base be of uniform diameter, the cutter *f* is not moved outward by the screw *g*, but is gradually fed forward by the feed-screw *r* toward the axis of the gun; but as soon as the rim-base begins to widen and spread over onto the body of the gun, the cutter *f* must be moved gradually outward by the screw *g*, so as to describe a continually wider circle, and at the same time the degree of aberration of its motion from that of a plane parallel to the axis of the gun must be gradually changed, so as to correspond to the required surface to be given to that part of the rim-base. This is effected by removing the guide-pin *p* or withdrawing its extremity from the groove *o* and inserting another guide-pin, *p'*, into the wide groove *o'*.

The vertical face of the groove *o* is a counterpart of the finished surface to be given to the lower part of the rim-base, or the surface of the gun around the rim base, so that the walls of the groove *o'* are not at right angles to the axis of the barrel *m*, (as are the walls of the smaller groove *o*,) but vary with the surface of the gun at different distances from the rim-base. At the extremity of the guide-pin *p'* is a small roller or wheel, *s*, with a rounded edge, which presses against one of the walls of the groove *o'*, and thus regulates the horizontal motion of the shaft *a*.

As the work of planing around the rim-base progresses, the guide-pin p' , which is screwed into the side of the bearer n , is screwed outward, so as to bring the guide-roller nearer to the circumference of the barrel, thus causing the curve described by the cutter f to vary with the varying conformation of the walls of the groove o' and plane the gun around the rim-base, so as to conform exactly to the shape of the walls of the groove.

Instead of the groove o' , a helichord may be employed, which is done by simply removing the rear wall of the groove o' , and the face of the helichord may be kept close up to the periphery of the guide-wheel s by a spring applied to the barrel m , or by a rope, pulley, and weight at the rear end of the shaft a .

In place of the grooved barrel m and its bearer n , a grooved frame, t , (see Fig. 4,) may be used, which is set on the sliding frame j just as the bearer n of the grooved barrel, as before described. This grooved frame t receives the shaft a , which is enlarged at that point, and from which projects a pin, u , which enters a groove in the frame t and revolves with the shaft like the groove in the barrel m , is of irregular curvature corresponding with the curve at the junction of the rim-base and body of the gun, and thus produces the same effect, as before described, of causing the cutters to plane the irregular curved surface required.

By attaching to the barrel m a former of the shape required to be planed, and using pin p' and roller s , (see Fig. 2,) my machine may be employed for planing any irregular curved surface on other articles besides the rim-bases of guns.

In Fig. 1, D represents one of the sight-masses, which is a piece of metal projecting from the body of the gun between the trunnions, to which a "sight" is to be attached. In order to plane the gun around this sight-mass and give the sight-mass the proper shape, the gun is turned on its axis until the trunnions are vertical, when a strap, v , (represented by dotted lines,) is placed around the lower trunnion. The strap v is attached to a pitman, w , attached to a crank, x , so that the rotation of the crank-shaft y causes a slight oscillation of the gun on its axis. The cutter f is then set so as to plane on one side of the sight-mass D,

and another cutter may be set in the other sliding bit, e' , so as to plane on the other side of the sight mass, and these cutters are fed outward from the center of the chuck or inward toward the sight-mass, until the surface of the gun on either side of it is properly planed. The same operation is performed to plane on either side of the sight-mass E near the breech of the gun and of the lock-masses F F, the cutters to plane the sight-mass E and lock-masses F F being fixed to a stand in the proper position.

Having thus described my improvement, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The mode hereinbefore described of planing irregular curved metallic surfaces by means of a revolving chuck furnished with one or more cutters capable of adjustment in a straight line toward or from the center of the chuck, and whose cutting-points are caused automatically to move parallel to that portion of the curved surface which it is intended they shall plane—that is to say, toward or from the axis of said body—by means of curved grooves, which actuate the chuck-arbor through the instrumentality of the guide-pins adjusted therein, or their equivalent, substantially as described.

2. The use of the grooved barrel, guide pin or pins, and adjustable bearer, in combination with the revolving cutter-shaft and chuck, for the purpose of communicating the required curved motion to the planer or cutting tool or tools, so as to plane the rim-bases of guns and other irregular curved metallic surfaces, substantially as hereinbefore described.

3. The mode of planing around the sight-masses and lock-masses of guns by giving to the gun an oscillating motion in front of a non-revolving cutter susceptible of motion to and from the gun by means of the trunnion-shaft v , pitman w , and crank-shaft y , or their equivalents, in combination with the cutter-shaft susceptible of automatic horizontal motion, substantially as described.

In testimony whereof I, the said EDWARD KAYLOR, have hereunto set my hand.

EDWARD KAYLOR.

Witnesses:

A. S. NICHOLSON,
JOHN M. NEAL.